A Comparison of the Heath and Robinson M.V. Moth Traps

By P. Waring*

Introduction

It is now fifteen years since the introduction of the Heath light trap for collecting moths. The trap has several important advantages over the standard Robinson moth trap. These have been outlined by Heath (1965). Chief of these advantages is that the trap can be operated from a 12V car battery while the Robinson trap requires a mains supply or generator. The cost of the equipment required to trap moths in a site where a mains supply is unavailable is thus considerably reduced. The trap itself retails at about half the price of the Robinson trap which now costs in the region of £60.00.

As a result of the portable nature of the Heath trap and the financial considerations involved, professional entomologists running a series of traps and amateurs equipping them-

	Date	Total numbers of Macro taken per trap per night			
		Robinson trap (125W M.V.)		Heath trap (6W Actinic)	
Series 1		Site 1	Site 2	Site 1	Site 2
	June 20/21	—	177	38	—
	June 22/23	91	—	—	34
	June 24/25	—	18	10	—
	June 26/27	89	—	—	50
	June 28/29	—	173	30	—
	June 30/July 1	62	—	—	57
	Geometric means	79.49	82.00	22.51	45.93
	Overall Geom mean for series	80.72		32.15	
Series 2		Site 1	Site 3	Site 1	Site 3
	July 18/19	—	363	74	—
	July 20/21	70	—	—	70
	July 22/23	—	213	52	—
	July26/27	437	—	—	140
	July/28/29	—	336	66	—
	Aug. 11/12	342	—	—	138
	Geometric means	218.70	296.10	63.33	110.60
	Overall Geom mean for series	254.5		83.68	
Series 3		Site 1	Site 3	Site 1	Site 3
	Aug. 14/15	—	76	20	—
	Aug. 17/18	121	—	—	83
	Aug. 19/20	—	257	31	—
	Aug. 21/22	35	—	—	17
	Aug. 23/24	—	31	9	—
	Aug. 25/26	55	—	—	24
	Geometric means	62.53	84.61	17.74	32.35
	Overall Geom mean for series	72.14		23.95	

TABLE 1

Total numbers of Macrolepidoptera taken in Robinson and Heath traps per night.

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selves for their hobby are showing considerable interest in the Heath trap as an alternative to the Robinson trap.

I myself acquired a Heath trap specifically as an aid to investigating the moth fauna of local nature reserves where a convenient mains supply is not always available. Being familiar with the catches obtained at the Robinson trap with a 125W M.V. bulb, I found it difficult not to compare the two types of trap. Heath (1965) states that the catch of macrolepidoptera is 56% and the number of species 68% of that in a Robinson trap fitted with a 160W blended M.V. lamp. Many nights the catches in my Heath trap seemed very low indeed, far below those to which I was accustomed, and various colleagues have related similar experiences. This prompted me to run a series of experiments to compare the performance of the two traps in a quantitative way for myself, and the results are contained here.

	Date	Numbers of species of Macro taken per trap per night			
		Robinson trap (125W M.V.)		Heath trap (6W Actinic)	
Series 1		Site 1	Site 2	Site 1	Site 2
	June 20/21	—	44	22	—
	June 22/23	30	—	—	22
	June 24/25	—	10	7	—
	June 26/27	29	—	—	21
	June 28/29	—	43	17	—
	June 30/July 1	27	—	—	20
	Geometric means	28.64	26.65	13.78	20.98
	Overall Geom mean for series	27.63		17.00	
Series 2		Site 1	Site 3	Site 1	Site 3
	July 18/19	—	53	21	—
	July 20/21	29	—	—	18
	July 22/23	—	46	18	—
	July 26/27	60	—	—	32
	July 28/29	—	62	19	—
	Aug. 11/12	50	—	—	21
	Geometric means	44.31	53.27	19.30	22.96
	Overall Geom mean for series	48.59		21.05	
Series 3		Site 1	Site 3	Site 1	Site 3
	Aug. 14/15	—	12	9	—
	Aug. 17/18	24	—	—	20
	Aug. 19/20	—	32	14	—
	Aug. 21/22	17	—	—	9
	Aug. 23/24	—	11	5	—
	Aug. 25/26	19	—	—	11
	Geometric means	19.79	16.16	8.57	12.56
	Overall Geom mean for series	17.88		10.38	

TABLE 2

Numbers of species of Macrolepidoptera taken in Robinson and Heath traps per night.

Experimental Procedure

Both traps were used in the form in which they are commercially available, and in which I imagine most entomologists operate them. The Robinson trap was supplied by Messrs. Watkins & Doncaster, Four Throws, Hawkhurst, Kent, and fitted with a 125W MB/U lamp; while the Heath trap was supplied by Entech Services, 46 Mersey View, Liverpool, L22 6QB, and was fitted with a 6W Actinic 5 tube. Both units were operated from the mains, the Heath trap employing a control unit for AC mains operation also available from Entech Services.

(A)

Geometric mean number of Macrolepidoptera taken			Heath Geometric mean catch as percent of Robinson Geometric mean catch
Series 1	Robinson 80.72	Heath 32.15	39.83%
Series 2	Robinson 254.50	Heath 83.68	32.88%
Series 3	Robinson 72.14	Heath 23.95	33.30%
			Mean of above results 35.30%

(B)

Geometric mean number of species of Macrolepidoptera taken			Heath Geometric mean as percent of Robinson Geometric mean
Series 1	Robinson 27.63	Heath 17.00	61.53%
Series 2	Robinson 48.59	Heath 21.05	43.32%
Series 3	Robinson 17.88	Heath 10.38	58.05%
			Mean of above results 54.30%

TABLE 3

Comparison of the number of individuals and number of species of Macrolepidoptera taken by Robinson and Heath traps, based on the geometric means of the catches.

The experiments were conducted in Wytham Wood, Oxfordshire. Since two traps cannot be run on the same night on the same site. allowances have to be made for differences in nights and trap location. Using two similar sites the traps can be run on the same night and by swapping the traps around every second night — preferably a night similar to the

first — the effect of differences due to site can be evened out. One trap-free night was allowed between each trap-night and the next, to allow the moth population some time to recover from disturbance of distribution that may be caused by the traps.

Three series of experiments were performed, each consisting of six trap-nights. In the first series, one site was a small glade by a single house in mixed deciduous woodland, with a large proportion of silver birch and an understorey of bramble and willowherb. The other site was mainly surrounded by beech. However, in the second and third series, the second site was moved to another glade similar to the first, but far enough away so that the two traps were screened from each other by bushes and trees, and the light from one trap was not visible from the other.

		Degrees of Freedom	Total Variance	Mean Variance	Percent Contribution to Total Variance in Data
Series 1	Nights	5	0.837294	0.167459	55.43
	Position	1	0.078389	0.078389	5.19
	Traps	1	0.479553	0.479553	31.75
	Residual	4	0.115189	0.028797	7.63
	Total	11	1.510425		
Series 2	Nights	5	0.409027	0.081805	31.72
	Position	1	0.104786	0.104786	8.13
	Traps	1	0.700036	0.700036	54.28
	Residual	4	0.075697	0.018924	5.87
	Total	11	1.289546		
Series 3	Nights	5	0.936740	0.187348	51.96
	Position	1	0.119600	0.119600	6.63
	Traps	1	0.687822	0.687822	38.14
	Residual	4	0.059029	0.014757	3.27
	Total	11	1.803191		

TABLE 4
Analysis of variance of the size of catches at the traps in Series 1, 2 and 3.

Results

The number of individuals and the number of species of macrolepidoptera taken at the traps in the experiments described above are given in tables 1 and 2 respectively, and in each case the geometric means are used for the comparison of the two traps as recommended by Williams (1951), see table 3.

To find out how much of the variation in the number of moths taken at the traps each night could be attributed to the differences in the two traps, rather than to differences in the nights of sites, an analysis of variance was performed, the results of which are presented in table 4. This shows that while the variance due to the site is small, changes in the nightly conditions account for a large amount of the total

variance in the data. The differences between the two types of trap are significant, being a 5% level in series 1 and 1% level in series 2 and 3.

Single Site Experiment

Many entomologists are in the habit of running a moth trap on a regular basis at a single site in their garden, and it is on the results of this experience that many base their opinions of trap performance. Alternating two different traps on one site has the disadvantage that the traps are never run on the same night, although the site is always the same. Comparison of the traps is aided if the traps are run on pairs of consecutive nights, so that night-time differences are minimised, although as already mentioned, there is the possibility of some carry-over effect from one night to the next with this method, depending on where the catches are released with respect to the trap. In Williams' experiment, there was no evidence of a carry-over effect (Williams et al., 1955). If the traps were switched on just after dusk, this would allow at least a little time for some free movement of the local moths to and from the site before the trap was operated.

This experimental approach was followed in a subsidiary series of experiments at my own garden site, using the same two traps from the main set of experiments. The ¾-acre garden site is bordered on one side by houses, and on the other three by farm meadows with hawthorn hedgerows.

The results from fourteen pairs of nights, together with a brief description of weather conditions on each night, are presented in table 5. On the fourteen pairs of nights, the Robinson trap follows the Heath trap on eight occasions. Comparing the geometric mean catches for the two traps as in the previous experiment, the Heath trap took 38.77% of the number of moths taken by the Robinson trap, and 55.84% of the number of species. It is interesting that figures are so close to the results of the first experiment, despite the difference in experimental procedure.

Discussion

As shown, my estimates of the relative performance of Heath trap with the Robinson trap, fall below those given by Heath in every case, both for numbers of moths and numbers of species. It must be pointed out that there are several differences in our experiments. Most importantly, while I have used traps as they are commercially available today, Heath used a 160W blended M.V. lamp in the Robinson trap. Heath's results are based on twelve nights of trapping, but he unfortunately gives no information on the sites used, the size of the catches obtained or the time of the year at which he was trapping, all of which may contribute to the differences in our results.

My results are from June to September, the height of the mothing season, but from my personal experience I have found that while the Robinson trap is certainly capable of 'pulling them in' on what are generally reckoned to be 'good'

Date (Date of morning following trap night in question)	Weather	Robinson trap (125W M.V.)		Heath trap (6W Actinic)	
		Number of moths	Number of species	Number of moths	Number of species
June 9	15—12.5°C XSD	—	—	14	4
10	15—12 °C XSD	85	25	—	—
12	16— 9 °C XSD	80	22	—	—
13	16—12 °C XSD	—	—	50	13
22	16— 8 °C XSD	—	—	22	11
23	14— 9.5°C OSD	73	22	—	—
24	13—10 °C XSR	—	—	36	16
25	13— 9.5°C OSR	21	8	—	—
26	13— 7 °C OSD	—	—	12	8
27	13— 9.5°C XSD	92	27	—	—
28	14—10 °C XSD	—	—	13	9
29	15.5—13°C XWD	75	22	—	—
30	12—11.5°C XSD	—	—	37	17
July 1	13—10 °C XSD	64	24	—	—
6	22—14 °C XSD	—	—	86	30
7	19—13 °C XSD	183	34	—	—
19	17—13.5°C XSD	217	38	—	—
20	17—13 °C XSD	—	—	71	25
21	17—13 °C XWD	163	32	—	—
22	15—10 °C XWD	—	—	52	23
Aug. 1	14—13 °C XWR	—	—	25	10
2	14—13 °C XWR	72	19	—	—
31	17—11 °C XSD	236	38	—	—
Sept. 1	17—15.5°C XSD	—	—	151	19
5	13— 9 °C OSD	123	22	—	—
6	15— 9 °C OSD	—	—	32	9
8	17—10 °C XSD	115	23	—	—
9	18—15 °C XSD	—	—	101	18
Geometric means		97.63	23.98	37.85	13.39

TABLE 5

Results of Single Site Experiment.

Weather Key: O=clear sky X=cloudy S=still W=windy (more than light breeze) D=dry R=some rain in night

nights, the catches vary in size from night to night much more than with the Heath trap. If I had been able to perform my experiments earlier in the year, say April or May, I think it is likely that estimates of the relative efficiency of the Heath trap might have been higher than those given.

Conclusion

From my experiments, I estimate that the standard Heath trap catches on average 35% of the number of moths and 54% of the number of species taken by the standard Robinson trap in the sites and conditions I have described. For myself, this result has the practical consequence that whenever I am examining the moth fauna of new areas, or when time is restricted, I will try and run a Robinson trap whenever possible. But as Heath points out, the Heath trap is a genuinely portable M.V. light trap, and can be operated in many sites and on many occasions where a Robinson trap is out of the question.

References

Heath, J., 1965. A genuinely portable M.V. Light Trap. *Ent. Rec.*, **77**: 236-238.

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Book Talk Three. — As an aid to quick identification of most of the British macro moths, the coloured illustrations in the early printings of Richard South's *Moths of the British Isles* are probably unsurpassed. Published by Warne in two pocket-sized volumes, the work first appeared in 1907-08 and contains 1,543 figures mostly reproduced from coloured photographs of set specimens from the collection of W. F. Warne. The blocks from which these plates were printed were used repeatedly for successive impressions over the next 40 years, resulting in later printings becoming somewhat blurred owing to wear, so that the earlier the issue that one can obtain of the book the better. Each impression is identifiable by the publication date printed on the reverse of the title-page, though an early copy in my possession, in which the plates are virtually as fine as those of the first impression, is for some unknown reason undated. In 1961, Warne published a third edition with new plates, but unlike the true to nature illustrations of the previous editions, these consist of figures reproduced from paintings and are by comparison generally poor and unrealistic. — J. M. Chalmers-Hunt.